

THE OPEN UNIVERSITY OF SRI LANKA

CONTINUOUS ASSESSMENT TEST I I- 2013/2014

MPZ 3132 – ENGINEERING MATHEMATICS IB

DURATION: 1.15 HOURS



Registration No:

Answer all the Questions

Date: 23th April 2014

Time: 10.45hrs – 12.00hrs

Important integrals

<ul style="list-style-type: none">• $\int e^{ax} \sin bx dx = \frac{e^{ax}}{a^2 + b^2} (a \sin bx - b \cos bx)$• $\int e^{ax} \cos bx dx = \frac{e^{ax}}{a^2 + b^2} (a \cos bx + b \sin bx)$

01.

D) Using a method of trial function find a particular solution of the differential equation

$$\frac{d^2y}{dx^2} + 4 \frac{dy}{dx} + 13y = 45e^{4x}. \text{ Hence find the general solution of the differential}$$

equation.

[40% marks]

II) With usual notation, prove that $\frac{1}{D+\alpha}f(x) = e^{-\alpha x} \frac{1}{D} e^{\alpha x} f(x)$. [25% marks]

III) Using rule of part II find a particular integral of $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = \sin 3x$

[35% marks]

02. I) With usual notation, prove that $\mathcal{L}\{\cos at\} = \frac{s}{s^2+a^2}$.

Using the shift theorem, deduce that $\mathcal{L}\{e^{3t}\cos 5t\} = \frac{s-3}{s^2-6s+34}$.

[40% marks]

II) If $\mathcal{L}\{F(t)\} = f(s)$ and $G(t) = \begin{cases} F(t-a), & t > a \\ 0, & t \leq a \end{cases}$,

then show that $\mathcal{L}\{G(t)\} = e^{-as}f(s)$ [30% marks]

III) Solve $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = 4e^{2t}$, $y(0) = -3, y'(0) = 5$.

[30% marks]

03. I) Shade the region satisfying the following inequalities.

a) $|Z - 5| \leq 5$ and $2 \leq \text{Im}(Z) \leq 4$.

b) $|Z - 3i| \geq |Z + 4|$.

[30% marks]

II) If , $f(Z) = \frac{5Z+3}{Z-3}$, $Z \neq 3$, then show that f is one to one and find the inverse

function of f .

[30% marks]

III) Find the value of $(1 + i)^i$.

[40% marks]